ABSTRACT

Automating inspection of moveable lane barrier for Auckland Harbour Bridge traffic safety

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A moveable lane barrier along the Auckland Harbour Bridge (AHB) enables two-way traffic flow optimisation and control. However, the AHB barrier transfer machines are not equipped with an automated solution for screening the pins that link the barrier segments. If the connecting metal pin pops out due to external force, the disjoined concrete barrier can be hazardous to motorist safety.

After being restricted due to pandemic lockdowns, I reviewed previous research in anomaly detection to overcome the challenge of a small and unbalanced dataset. A technique was needed for a robust approach to data analysis and modelling on initially small and unbalanced datasets for similar circumstances where the expected dataset size may or may not become available within the expected timeframes. My research introduced a collectively synthetic minority-class data boosting, adaptive, incremental, and transfer learning method that utilises pre-trained neural networks. A novel technique for obtaining synthetic frames with different degrees of unsafe pin images cloned from the original video frames allowed a robust data analysis and modelling approach on small and unbalanced datasets. A universal system is produced for automated inspection that can ease the day-to-day work stress of the AHB safety inspectors. This system can be applied globally with minimum modifications to similar traffic management or anomaly detection and tracking scenarios.

This presentation aims to introduce the proposed proof of concept (PoC) for supplementing movable lane barrier inspection. The produced PoC can be deployed on a vehicle or AHB barrier transfer machine to detect the unsafe pin and alert the user.